Appendix O

Human Health Risk Assessment ProUCL Outputs

Northwest Boundary Area RCRA Facility Investigation
Fort Buchanan, Puerto Rico

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	10000

ALUMINUM

General Statistics

Number of Valid Observations	11	Number of Distinct Observations	10

Raw Statistics		Log-transformed Statistics	
Minimum	21500	Minimum of Log Data	9.976
Maximum	30100	Maximum of Log Data	10.31
Mean	25577	Mean of log Data	10.14
Median	25700	SD of log Data	0.126
SD	3184		
Std. Error of Mean	959.9		
Coefficient of Variation	0.124		
Skewness	-0.0202		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.906	Shapiro Wilk Test Statistic	0.901
Shapiro Wilk Critical Value	0.85	Shapiro Wilk Critical Value	0.85
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	27317	95% H-UCL	27498
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	29806
95% Adjusted-CLT UCL (Chen-1995)	27150	97.5% Chebyshev (MVUE) UCL	31635
95% Modified-t UCL (Johnson-1978)	27316	99% Chebyshev (MVUE) UCL	35228

Gamma Distribution Test		Data Distribution
k star (bias corrected)	51.21	**Data appear Normal at 5% Significance Level**
Theta Star	499.4	
MLE of Mean	25577	
MLE of Standard Deviation	3574	
nu star	1127	
Approximate Chi Square Value (.05)	1050	**Nonparametric Statistics**
Adjusted Level of Significance	0.0278	95% CLT UCL 27156
Adjusted Chi Square Value	1038	95% Jackknife UCL 27317
		95% Standard Bootstrap UCL 27088
Anderson-Darling Test Statistic	0.486	95% Bootstrap-t UCL 27316
Anderson-Darling 5% Critical Value	0.727	95% Hall's Bootstrap UCL 26965
Kolmogorov-Smirnov Test Statistic	0.199	95% Percentile Bootstrap UCL 27082
Kolmogorov-Smirnov 5% Critical Value	0.255	95% BCA Bootstrap UCL 27055
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 29761
		97.5% Chebyshev(Mean, Sd) UCL 31572
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 35128
95% Approximate Gamma UCL	27452	
95% Adjusted Gamma UCL	27772	

Potential UCL to Use Use 95% Student's-t UCL 27317

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Note: For highly negative-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

ANTIMONY

General Statistics

Number of Valid Data	21	Number of Detected Data	12
Number of Distinct Detected Data	10	Number of Non-Detect Data	9
		Percent Non-Detects	42.86%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.52	Minimum Detected	-0.654
Maximum Detected	4.1	Maximum Detected	1.411
Mean of Detected	1.465	Mean of Detected	0.155
SD of Detected	1.231	SD of Detected	0.648
Minimum Non-Detect	0.81	Minimum Non-Detect	-0.211
Maximum Non-Detect	5.3	Maximum Non-Detect	1.668

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	21
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.646	Shapiro Wilk Test Statistic	0.835
5% Shapiro Wilk Critical Value	0.859	5% Shapiro Wilk Critical Value	0.859
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.321	Mean	0.0376
SD	1.072	SD	0.678
95% DL/2 (t) UCL	1.725	95% H-Stat (DL/2) UCL	1.814
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.045
		SD in Log Scale	0.557
		Mean in Original Scale	1.159
		SD in Original Scale	0.988
		95% t UCL	1.531
		95% Percentile Bootstrap UCL	1.529
		95% BCA Bootstrap UCL	1.661
		95% H-UCL	1.44

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.82	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	0.805		
nu star	43.67		
A-D Test Statistic	1.285	**Nonparametric Statistics**	
5% A-D Critical Value	0.741	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.741	Mean	1.193
5% K-S Critical Value	0.248	SD	1.012
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.245
		95% KM (t) UCL	1.616
Assuming Gamma Distribution		95% KM (z) UCL	1.596
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.611
Minimum	0.0385	95% KM (bootstrap t) UCL	2.397
Maximum	4.1	95% KM (BCA) UCL	1.655
Mean	1.189	95% KM (Percentile Bootstrap) UCL	1.627
Median	1.107	95% KM (Chebyshev) UCL	2.261
SD	1.009	97.5% KM (Chebyshev) UCL	2.723
k star	1.572	99% KM (Chebyshev) UCL	3.63
Theta star	0.756		
Nu star	66.03	**Potential UCLs to Use**	
AppChi2	48.33	95% KM (t) UCL	1.616
95% Gamma Approximate UCL	1.624	95% KM (% Bootstrap) UCL	1.627
95% Adjusted Gamma UCL	1.664		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

AROCLOR 1254

General Statistics

Number of Valid Data	21	Number of Detected Data	1
Number of Distinct Detected Data	1	Number of Non-Detect Data	20
		Percent Non-Detects	95.24%

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable AROCLOR 1254 was not processed!

ARSENIC

General Statistics

Number of Valid Observations	21	Number of Distinct Observations	21

Raw Statistics		**Log-transformed Statistics**	
Minimum	3.6	Minimum of Log Data	1.281
Maximum	72	Maximum of Log Data	4.277
Mean	28.75	Mean of log Data	3.125
Median	25.9	SD of log Data	0.763
SD	18.42		
Std. Error of Mean	4.021		
Coefficient of Variation	0.641		
Skewness	0.801		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.944	Shapiro Wilk Test Statistic	0.963
Shapiro Wilk Critical Value	0.908	Shapiro Wilk Critical Value	0.908
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	35.69	95% H-UCL	44.79
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	53.38
95% Adjusted-CLT UCL (Chen-1995)	36.12	97.5% Chebyshev (MVUE) UCL	63.53
95% Modified-t UCL (Johnson-1978)	35.81	99% Chebyshev (MVUE) UCL	83.47

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.992	**Data appear Normal at 5% Significance Level**	
Theta Star	14.43		
MLE of Mean	28.75		
MLE of Standard Deviation	20.37		
nu star	83.68		
Approximate Chi Square Value (.05)	63.6	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0383	95% CLT UCL	35.37
Adjusted Chi Square Value	62.26	95% Jackknife UCL	35.69
		95% Standard Bootstrap UCL	35.16
Anderson-Darling Test Statistic	0.111	95% Bootstrap-t UCL	36.69
Anderson-Darling 5% Critical Value	0.753	95% Hall's Bootstrap UCL	36.58
Kolmogorov-Smirnov Test Statistic	0.0943	95% Percentile Bootstrap UCL	35.3
Kolmogorov-Smirnov 5% Critical Value	0.192	95% BCA Bootstrap UCL	35.88
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	46.28
		97.5% Chebyshev(Mean, Sd) UCL	53.86
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	68.76
95% Approximate Gamma UCL	37.83		
95% Adjusted Gamma UCL	38.65		

Potential UCL to Use	
Use 95% Student's-t UCL	35.69

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

BENZO_A_PYRENE

General Statistics

Number of Valid Data	21	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	19
		Percent Non-Detects	90.48%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0128	Minimum Detected	-4.358
Maximum Detected	0.0162	Maximum Detected	-4.123
Mean of Detected	0.0145	Mean of Detected	-4.241
SD of Detected	0.0024	SD of Detected	0.167
Minimum Non-Detect	0.00058	Minimum Non-Detect	-7.452
Maximum Non-Detect	0.00077	Maximum Non-Detect	-7.169

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	19
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	90.48%

Warning: Data set has only 2 Distinct Detected Values.
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.00169	Mean	-7.633
SD	0.00429	SD	1.131
95% DL/2 (t) UCL	0.0033	95% H-Stat (DL/2) UCL	0.00184
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% t UCL	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
		95% H-UCL	N/A

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	**Nonparametric Statistics**	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.013
5% K-S Critical Value	N/A	SD	0.0007241
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0002235
		95% KM (t) UCL	0.0133
Assuming Gamma Distribution		95% KM (z) UCL	0.0133
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0152
Minimum	N/A	95% KM (bootstrap t) UCL	N/A
Maximum	N/A	95% KM (BCA) UCL	0.0162
Mean	N/A	95% KM (Percentile Bootstrap) UCL	N/A
Median	N/A	95% KM (Chebyshev) UCL	0.0139

SD	N/A	97.5% KM (Chebyshev) UCL	0.0144
k star	N/A	99% KM (Chebyshev) UCL	0.0152
Theta star	N/A		
Nu star	N/A	**Potential UCLs to Use**	
AppChi2	N/A	95% KM (t) UCL	0.0133
95% Gamma Approximate UCL	N/A	95% KM (% Bootstrap) UCL	N/A
95% Adjusted Gamma UCL	N/A		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

CHROMIUM

General Statistics

Number of Valid Observations	21	Number of Distinct Observations	21

Raw Statistics		**Log-transformed Statistics**	
Minimum	22.2	Minimum of Log Data	3.1
Maximum	189.5	Maximum of Log Data	5.244
Mean	61.37	Mean of log Data	3.97
Median	46.4	SD of log Data	0.523
SD	39.7		
Std. Error of Mean	8.664		
Coefficient of Variation	0.647		
Skewness	2.013		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.763	Shapiro Wilk Test Statistic	0.921
Shapiro Wilk Critical Value	0.908	Shapiro Wilk Critical Value	0.908
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	76.31	95% H-UCL	76.82
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	91.5
95% Adjusted-CLT UCL (Chen-1995)	79.68	97.5% Chebyshev (MVUE) UCL	105
95% Modified-t UCL (Johnson-1978)	76.94	99% Chebyshev (MVUE) UCL	131.5

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	3.081	**Data appear Lognormal at 5% Significance Level**	
Theta Star	19.92		
MLE of Mean	61.37		
MLE of Standard Deviation	34.96		
nu star	129.4		
Approximate Chi Square Value (.05)	104.1	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0383	95% CLT UCL	75.62
Adjusted Chi Square Value	102.4	95% Jackknife UCL	76.31
		95% Standard Bootstrap UCL	75.2
Anderson-Darling Test Statistic	1.106	95% Bootstrap-t UCL	84.83
Anderson-Darling 5% Critical Value	0.748	95% Hall's Bootstrap UCL	85.45
Kolmogorov-Smirnov Test Statistic	0.231	95% Percentile Bootstrap UCL	76.13
Kolmogorov-Smirnov 5% Critical Value	0.191	95% BCA Bootstrap UCL	79.46
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	99.13
		97.5% Chebyshev(Mean, Sd) UCL	115.5
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	147.6
95% Approximate Gamma UCL	76.26		
95% Adjusted Gamma UCL	77.56		

Potential UCL to Use		
	Use 95% H-UCL	76.82

ProUCL computes and outputs H-statistic based UCLs for historical reasons only.
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

COBALT

General Statistics

Number of Valid Data	21	Number of Detected Data	16
Number of Distinct Detected Data	15	Number of Non-Detect Data	5
		Percent Non-Detects	23.81%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	5.7	Minimum Detected	1.74
Maximum Detected	37.7	Maximum Detected	3.63
Mean of Detected	11.7	Mean of Detected	2.335
SD of Detected	7.791	SD of Detected	0.459
Minimum Non-Detect	1.7	Minimum Non-Detect	0.531
Maximum Non-Detect	9.3	Maximum Non-Detect	2.23

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	12
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	9
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	57.14%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.626	Shapiro Wilk Test Statistic	0.842
5% Shapiro Wilk Critical Value	0.887	5% Shapiro Wilk Critical Value	0.887
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	9.467	Mean	1.935
SD	7.921	SD	0.888
95% DL/2 (t) UCL	12.45	95% H-Stat (DL/2) UCL	16.61
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	5.786	Mean in Log Scale	2.125
SD	11.32	SD in Log Scale	0.559
95% MLE (t) UCL	10.05	Mean in Original Scale	9.947
95% MLE (Tiku) UCL	11.65	SD in Original Scale	7.482
		95% t UCL	12.76
		95% Percentile Bootstrap UCL	12.82
		95% BCA Bootstrap UCL	13.88
		95% H UCL	12.65

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	3.436	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	3.404		
nu star	109.9		
A-D Test Statistic	1.358	**Nonparametric Statistics**	
5% A-D Critical Value	0.742	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.742	Mean	10.32
5% K-S Critical Value	0.216	SD	7.037
Data not Gamma Distributed at 5% Significance Level		SE of Mean	1.587
		95% KM (t) UCL	13.06
Assuming Gamma Distribution		95% KM (z) UCL	12.93
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	12.86
Minimum	0.000001	95% KM (bootstrap t) UCL	16.98
Maximum	37.7	95% KM (BCA) UCL	13.67
Mean	9.097	95% KM (Percentile Bootstrap) UCL	13.25
Median	8	95% KM (Chebyshev) UCL	17.24
SD	8.297	97.5% KM (Chebyshev) UCL	20.23
k star	0.236	99% KM (Chebyshev) UCL	26.11
Theta star	38.47		
Nu star	9.932	**Potential UCLs to Use**	
AppChi2	3.899	95% KM (BCA) UCL	13.67
95% Gamma Approximate UCL	23.17		
95% Adjusted Gamma UCL	25.01		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

ETHYLBENZENE

General Statistics

Number of Valid Data	21	Number of Detected Data	1
Number of Distinct Detected Data	1	Number of Non-Detect Data	20
		Percent Non-Detects	95.24%

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable ETHYLBENZENE was not processed!

IRON

General Statistics

Number of Valid Observations	11	Number of Distinct Observations	10

Raw Statistics		Log-transformed Statistics	
Minimum	26500	Minimum of Log Data	10.18
Maximum	71400	Maximum of Log Data	11.18
Mean	36341	Mean of log Data	10.45
Median	32500	SD of log Data	0.299
SD	13163		
Std. Error of Mean	3969		
Coefficient of Variation	0.362		
Skewness	2.174		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.744	Shapiro Wilk Test Statistic	0.846
Shapiro Wilk Critical Value	0.85	Shapiro Wilk Critical Value	0.85
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	43534	95% H-UCL	43625
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	50445
95% Adjusted-CLT UCL (Chen-1995)	45649	97.5% Chebyshev (MVUE) UCL	56633
95% Modified-t UCL (Johnson-1978)	43968	99% Chebyshev (MVUE) UCL	68788

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	8.114	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	4479		
MLE of Mean	36341		
MLE of Standard Deviation	12758		
nu star	178.5		
Approximate Chi Square Value (.05)	148.6	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0278	95% CLT UCL	42869
Adjusted Chi Square Value	144.2	95% Jackknife UCL	43534
		95% Standard Bootstrap UCL	42545
Anderson-Darling Test Statistic	0.745	95% Bootstrap-t UCL	51240
Anderson-Darling 5% Critical Value	0.729	95% Hall's Bootstrap UCL	70070
Kolmogorov-Smirnov Test Statistic	0.226	95% Percentile Bootstrap UCL	43218
Kolmogorov-Smirnov 5% Critical Value	0.255	95% BCA Bootstrap UCL	45755
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	53641
		97.5% Chebyshev(Mean, Sd) UCL	61126
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	75830
95% Approximate Gamma UCL	43653		
95% Adjusted Gamma UCL	45000		

Potential UCL to Use	
Use 95% Approximate Gamma UCL	43653

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

MANGANESE

General Statistics

Number of Valid Observations	11	Number of Distinct Observations	10

Raw Statistics		**Log-transformed Statistics**	
Minimum	192	Minimum of Log Data	5.257
Maximum	782	Maximum of Log Data	6.662
Mean	486.2	Mean of log Data	6.099
Median	431	SD of log Data	0.448
SD	208.5		
Std. Error of Mean	62.85		
Coefficient of Variation	0.429		
Skewness	0.484		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.888	Shapiro Wilk Test Statistic	0.933
Shapiro Wilk Critical Value	0.85	Shapiro Wilk Critical Value	0.85
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	600.1	95% H-UCL	664.2
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	779.9
95% Adjusted-CLT UCL (Chen-1995)	599.4	97.5% Chebyshev (MVUE) UCL	906.4
95% Modified-t UCL (Johnson-1978)	601.6	99% Chebyshev (MVUE) UCL	1155

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	4.326	**Data appear Normal at 5% Significance Level**	
Theta Star	112.4		
MLE of Mean	486.2		
MLE of Standard Deviation	233.8		
nu star	95.17		
Approximate Chi Square Value (.05)	73.67	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0278	95% CLT UCL	589.6
Adjusted Chi Square Value	70.59	95% Jackknife UCL	600.1
		95% Standard Bootstrap UCL	584.9
Anderson-Darling Test Statistic	0.382	95% Bootstrap-t UCL	617.9
Anderson-Darling 5% Critical Value	0.731	95% Hall's Bootstrap UCL	587.4
Kolmogorov-Smirnov Test Statistic	0.185	95% Percentile Bootstrap UCL	587.7
Kolmogorov-Smirnov 5% Critical Value	0.256	95% BCA Bootstrap UCL	594
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	760.2
		97.5% Chebyshev(Mean, Sd) UCL	878.7
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1112
95% Approximate Gamma UCL	628.1		
95% Adjusted Gamma UCL	655.5		

Potential UCL to Use	
Use 95% Student's-t UCL	600.1

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

VANADIUM

General Statistics

Number of Valid Observations	21	Number of Distinct Observations	20

Raw Statistics		**Log-transformed Statistics**	
Minimum	81	Minimum of Log Data	4.394
Maximum	238.5	Maximum of Log Data	5.474
Mean	130.9	Mean of log Data	4.813
Median	111	SD of log Data	0.351
SD	48.43		
Std. Error of Mean	10.57		
Coefficient of Variation	0.37		
Skewness	0.771		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.858	Shapiro Wilk Test Statistic	0.885
Shapiro Wilk Critical Value	0.908	Shapiro Wilk Critical Value	0.908
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	149.1	95% H-UCL	151.7
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	175
95% Adjusted-CLT UCL (Chen-1995)	150.1	97.5% Chebyshev (MVUE) UCL	194.3
95% Modified-t UCL (Johnson-1978)	149.4	99% Chebyshev (MVUE) UCL	232

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	7.217	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	18.13		
MLE of Mean	130.9		
MLE of Standard Deviation	48.71		
nu star	303.1		
Approximate Chi Square Value (.05)	263.8	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0383	95% CLT UCL	148.2
Adjusted Chi Square Value	261	95% Jackknife UCL	149.1
		95% Standard Bootstrap UCL	147.7
Anderson-Darling Test Statistic	1.141	95% Bootstrap-t UCL	151.7
Anderson-Darling 5% Critical Value	0.743	95% Hall's Bootstrap UCL	149.1
Kolmogorov-Smirnov Test Statistic	0.218	95% Percentile Bootstrap UCL	148.5
Kolmogorov-Smirnov 5% Critical Value	0.19	95% BCA Bootstrap UCL	149.4
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	176.9
		97.5% Chebyshev(Mean, Sd) UCL	196.9
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	236
95% Approximate Gamma UCL	150.4		
95% Adjusted Gamma UCL	152		

Potential UCL to Use	
Use 95% Student's-t UCL	149.1
or 95% Modified-t UCL	149.4

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	Sheet2.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	10000

1,1,2-TRICHLOROETHANE

General Statistics

Number of Valid Data	116	Number of Detected Data	18
Number of Distinct Detected Data	16	Number of Non-Detect Data	98
		Percent Non-Detects	84.48%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.29	Minimum Detected	-1.238
Maximum Detected	25.55	Maximum Detected	3.241
Mean of Detected	4.254	Mean of Detected	0.351
SD of Detected	7.772	SD of Detected	1.357
Minimum Non-Detect	0.17	Minimum Non-Detect	-1.772
Maximum Non-Detect	0.49	Maximum Non-Detect	-0.713

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	101
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	15
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	87.07%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.544	Shapiro Wilk Test Statistic	0.833
5% Shapiro Wilk Critical Value	0.897	5% Shapiro Wilk Critical Value	0.897
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.78	Mean	-1.671
SD	3.342	SD	1.086
95% DL/2 (t) UCL	1.294	95% H-Stat (DL/2) UCL	0.428
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-4.671
		SD in Log Scale	3.102
		Mean in Original Scale	0.679
		SD in Original Scale	3.361
		95% t UCL	1.197
		95% Percentile Bootstrap UCL	1.232
		95% BCA Bootstrap UCL	1.508
		95% H-UCL	4.566

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	0.51
Theta Star	8.336
nu star	18.37
A-D Test Statistic	2.205
5% A-D Critical Value	0.794
K-S Test Statistic	0.794
5% K-S Critical Value	0.214
Data not Gamma Distributed at 5% Significance Level	
Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	25.55
Mean	0.66
Median	0.000001
SD	3.365
k star	0.0788
Theta star	8.376
Nu star	18.29
AppChi2	9.597
95% Gamma Approximate UCL	1.258
95% Adjusted Gamma UCL	1.268

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only
Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	0.906
SD	3.303
SE of Mean	0.316
95% KM (t) UCL	1.429
95% KM (z) UCL	1.425
95% KM (jackknife) UCL	1.335
95% KM (bootstrap t) UCL	2.396
95% KM (BCA) UCL	1.684
95% KM (Percentile Bootstrap) UCL	1.522
95% KM (Chebyshev) UCL	2.281
97.5% KM (Chebyshev) UCL	2.877
99% KM (Chebyshev) UCL	4.046
Potential UCLs to Use	
95% KM (BCA) UCL	1.684

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

1,2-DICHLOROETHANE

General Statistics

Number of Valid Data	116	Number of Detected Data	10
Number of Distinct Detected Data	10	Number of Non-Detect Data	106
		Percent Non-Detects	91.38%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.31	Minimum Detected	-1.171
Maximum Detected	0.575	Maximum Detected	-0.553
Mean of Detected	0.461	Mean of Detected	-0.79
SD of Detected	0.0811	SD of Detected	0.19
Minimum Non-Detect	0.29	Minimum Non-Detect	-1.238
Maximum Non-Detect	4.35	Maximum Non-Detect	1.47

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	116
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	0
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.929
5% Shapiro Wilk Critical Value	0.842
Data appear Normal at 5% Significance Level	
Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	0.237
SD	0.27
95% DL/2 (t) UCL	0.278
Maximum Likelihood Estimate(MLE) Method	N/A
MLE method failed to converge properly	

Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.898
5% Shapiro Wilk Critical Value	0.842
Data appear Lognormal at 5% Significance Level	
Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	-1.646
SD	0.495
95% H-Stat (DL/2) UCL	0.237
Log ROS Method	
Mean in Log Scale	-1.658
SD in Log Scale	0.452
Mean in Original Scale	0.211
SD in Original Scale	0.103
95% t UCL	0.227
95% Percentile Bootstrap UCL	0.227
95% BCA Bootstrap UCL	0.229
95% H-UCL	0.228

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	22.85
Theta Star	0.0202
nu star	457
A-D Test Statistic	0.52
5% A-D Critical Value	0.724
K-S Test Statistic	0.724
5% K-S Critical Value	0.266
Data appear Gamma Distributed at 5% Significance Level	
Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	0.575
Mean	0.0524
Median	0.000001
SD	0.137
k star	0.0963
Theta star	0.545
Nu star	22.33
AppChi2	12.59
95% Gamma Approximate UCL	0.093
95% Adjusted Gamma UCL	0.0937

Data Distribution Test with Detected Values Only
Data appear Normal at 5% Significance Level

Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	0.324
SD	0.0492
SE of Mean	0.00495
95% KM (t) UCL	0.332
95% KM (z) UCL	0.332
95% KM (jackknife) UCL	0.354
95% KM (bootstrap t) UCL	0.332
95% KM (BCA) UCL	0.455
95% KM (Percentile Bootstrap) UCL	0.413
95% KM (Chebyshev) UCL	0.345
97.5% KM (Chebyshev) UCL	0.355
99% KM (Chebyshev) UCL	0.373
Potential UCLs to Use	
95% KM (t) UCL	0.332
95% KM (Percentile Bootstrap) UCL	0.413

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

1,2-DICHLOROETHENE

General Statistics

Number of Valid Data	94	Number of Detected Data	46
Number of Distinct Detected Data	44	Number of Non-Detect Data	48
		Percent Non-Detects	51.06%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.315	Minimum Detected	-1.155
Maximum Detected	270	Maximum Detected	5.598
Mean of Detected	38.55	Mean of Detected	2.397
SD of Detected	70.31	SD of Detected	1.673
Minimum Non-Detect	0.16	Minimum Non-Detect	-1.833
Maximum Non-Detect	0.27	Maximum Non-Detect	-1.309

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	48
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	46
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	51.06%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.549	Shapiro Wilk Test Statistic	0.967
5% Shapiro Wilk Critical Value	0.945	5% Shapiro Wilk Critical Value	0.945
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	18.92	Mean	0.0351
SD	52.59	SD	2.602
95% DL/2 (t) UCL	27.93	95% H-Stat (DL/2) UCL	94.96
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	0.163
		SD in Log Scale	2.66
		Mean in Original Scale	19
		SD in Original Scale	52.56
		95% t UCL	28.01
		95% Percentile Bootstrap UCL	28.48
		95% BCA Bootstrap UCL	30.74
		95% H-UCL	131.5

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.487	**Data appear Lognormal at 5% Significance Level**	
Theta Star	79.19		
nu star	44.78		
A-D Test Statistic	1.89	**Nonparametric Statistics**	
5% A-D Critical Value	0.813	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.813	Mean	19.03
5% K-S Critical Value	0.138	SD	52.27
Data not Gamma Distributed at 5% Significance Level		SE of Mean	5.451
		95% KM (t) UCL	28.08
Assuming Gamma Distribution		95% KM (z) UCL	27.99
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	27.93
Minimum	0.000001	95% KM (bootstrap t) UCL	31.83

Maximum	270	95% KM (BCA) UCL	28.66
Mean	18.87	95% KM (Percentile Bootstrap) UCL	28.48
Median	0.000001	95% KM (Chebyshev) UCL	42.78
SD	52.61	97.5% KM (Chebyshev) UCL	53.07
k star	0.0971	99% KM (Chebyshev) UCL	73.26
Theta star	194.4		
Nu star	18.25	**Potential UCLs to Use**	
AppChi2	9.569	95% KM (Chebyshev) UCL	42.78
95% Gamma Approximate UCL	35.97		
95% Adjusted Gamma UCL	36.34		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

1,4-DICHLOROBENZENE

General Statistics

Number of Valid Data	42	Number of Detected Data	1
Number of Distinct Detected Data	1	Number of Non-Detect Data	41
		Percent Non-Detects	97.62%

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,4-DICHLOROBENZENE was not processed!

ALUMINUM

General Statistics

Number of Valid Data	21	Number of Detected Data	17
Number of Distinct Detected Data	17	Number of Non-Detect Data	4
		Percent Non-Detects	19.05%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	25.1	Minimum Detected	3.223
Maximum Detected	15100	Maximum Detected	9.622
Mean of Detected	1366	Mean of Detected	5.52
SD of Detected	3633	SD of Detected	1.757
Minimum Non-Detect	31.7	Minimum Non-Detect	3.456
Maximum Non-Detect	174	Maximum Non-Detect	5.159

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	11
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	10
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	52.38%

UCL Statistics

Normal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.402
5% Shapiro Wilk Critical Value	0.892
Data not Normal at 5% Significance Level	
Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	1114
SD	3293
95% DL/2 (t) UCL	2353
Maximum Likelihood Estimate(MLE) Method	N/A
MLE yields a negative mean	

Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.94
5% Shapiro Wilk Critical Value	0.892
Data appear Lognormal at 5% Significance Level	
Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	5.138
SD	1.79
95% H-Stat (DL/2) UCL	3847
Log ROS Method	
Mean in Log Scale	5.057
SD in Log Scale	1.873
Mean in Original Scale	1111
SD in Original Scale	3294
95% t UCL	2351
95% Percentile Bootstrap UCL	2474
95% BCA Bootstrap UCL	3372
95% H-UCL	4698

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	0.359
Theta Star	3801
nu star	12.22
A-D Test Statistic	1.391
5% A-D Critical Value	0.822
K-S Test Statistic	0.822
5% K-S Critical Value	0.224
Data not Gamma Distributed at 5% Significance Level	
Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	15100
Mean	1106
Median	98.4
SD	3295
k star	0.159
Theta star	6943
Nu star	6.69
AppChi2	2.002
95% Gamma Approximate UCL	3696
95% Adjusted Gamma UCL	4085

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only
Data appear Lognormal at 5% Significance Level

Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	1113
SD	3214
SE of Mean	722.8
95% KM (t) UCL	2360
95% KM (z) UCL	2302
95% KM (jackknife) UCL	2352
95% KM (bootstrap t) UCL	10484
95% KM (BCA) UCL	2485
95% KM (Percentile Bootstrap) UCL	2466
95% KM (Chebyshev) UCL	4264
97.5% KM (Chebyshev) UCL	5627
99% KM (Chebyshev) UCL	8305
Potential UCLs to Use	
99% KM (Chebyshev) UCL	8305

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

ANTIMONY

General Statistics

Number of Valid Data	48	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	46
		Percent Non-Detects	95.83%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	1.9	Minimum Detected	0.642
Maximum Detected	29.8	Maximum Detected	3.395
Mean of Detected	15.85	Mean of Detected	2.018
SD of Detected	19.73	SD of Detected	1.946
Minimum Non-Detect	1.8	Minimum Non-Detect	0.588
Maximum Non-Detect	10	Maximum Non-Detect	2.303

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	47
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	97.92%

Warning: Data set has only 2 Distinct Detected Values.
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2.799	Mean	0.764
SD	4.066	SD	0.605
95% DL/2 (t) UCL	3.784	95% H-Stat (DL/2) UCL	3.066
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% t UCL	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
		95% H-UCL	N/A

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	N/A
5% A-D Critical Value	N/A
K-S Test Statistic	N/A
5% K-S Critical Value	N/A
Data not Gamma Distributed at 5% Significance Level	
Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	N/A
Maximum	N/A
Mean	N/A
Median	N/A
SD	N/A
k star	N/A
Theta star	N/A
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL	N/A
95% Adjusted Gamma UCL	N/A

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only
Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	2.481
SD	3.985
SE of Mean	0.813
95% KM (t) UCL	3.846
95% KM (z) UCL	3.819
95% KM (jackknife) UCL	20.64
95% KM (bootstrap t) UCL	N/A
95% KM (BCA) UCL	29.8
95% KM (Percentile Bootstrap) UCL	N/A
95% KM (Chebyshev) UCL	6.027
97.5% KM (Chebyshev) UCL	7.561
99% KM (Chebyshev) UCL	10.57
Potential UCLs to Use	
95% KM (Chebyshev) UCL	6.027

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

ARSENIC

General Statistics

Number of Valid Data	48	Number of Detected Data	13
Number of Distinct Detected Data	13	Number of Non-Detect Data	35
		Percent Non-Detects	72.92%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	1.7	Minimum Detected	0.531
Maximum Detected	274	Maximum Detected	5.613
Mean of Detected	30.38	Mean of Detected	2.117
SD of Detected	73.95	SD of Detected	1.435
Minimum Non-Detect	1.7	Minimum Non-Detect	0.531
Maximum Non-Detect	6	Maximum Non-Detect	1.792

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	40
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	8
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	83.33%

UCL Statistics

Normal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.418
5% Shapiro Wilk Critical Value	0.866
Data not Normal at 5% Significance Level	
Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	9.768
SD	39.47
95% DL/2 (t) UCL	19.33
Maximum Likelihood Estimate(MLE) Method	N/A
MLE yields a negative mean	

Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.888
5% Shapiro Wilk Critical Value	0.866
Data appear Lognormal at 5% Significance Level	
Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	1.067
SD	1.035
95% H-Stat (DL/2) UCL	7.105
Log ROS Method	
Mean in Log Scale	-0.113
SD in Log Scale	1.973
Mean in Original Scale	8.89
SD in Original Scale	39.66
95% t UCL	18.49
95% Percentile Bootstrap UCL	19.87
95% BCA Bootstrap UCL	27.21
95% H-UCL	17.43

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	0.429
Theta Star	70.78
nu star	11.16
A-D Test Statistic	1.449
5% A-D Critical Value	0.792
K-S Test Statistic	0.792
5% K-S Critical Value	0.25
Data not Gamma Distributed at 5% Significance Level	
Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	274
Mean	9.095
Median	0.000001
SD	39.76
k star	0.0892
Theta star	102
Nu star	8.56
AppChi2	3.063
95% Gamma Approximate UCL	25.41
95% Adjusted Gamma UCL	26.28

Data Distribution Test with Detected Values Only
Data appear Lognormal at 5% Significance Level

Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	9.628
SD	39.08
SE of Mean	5.872
95% KM (t) UCL	19.48
95% KM (z) UCL	19.29
95% KM (jackknife) UCL	19.1
95% KM (bootstrap t) UCL	66.84
95% KM (BCA) UCL	21.39
95% KM (Percentile Bootstrap) UCL	20.72
95% KM (Chebyshev) UCL	35.22
97.5% KM (Chebyshev) UCL	46.3
99% KM (Chebyshev) UCL	68.05
Potential UCLs to Use	
95% KM (BCA) UCL	21.39

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

BARIUM

General Statistics

Number of Valid Data	48	Number of Detected Data	38
Number of Distinct Detected Data	38	Number of Non-Detect Data	10
		Percent Non-Detects	20.83%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	9.4	Minimum Detected	2.241
Maximum Detected	1920	Maximum Detected	7.56
Mean of Detected	210.6	Mean of Detected	4.773
SD of Detected	329.6	SD of Detected	1.066
Minimum Non-Detect	14.6	Minimum Non-Detect	2.681
Maximum Non-Detect	198.5	Maximum Non-Detect	5.291

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	36
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	12
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	75.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.509	Shapiro Wilk Test Statistic	0.976
5% Shapiro Wilk Critical Value	0.938	5% Shapiro Wilk Critical Value	0.938
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	175.2	Mean	4.503
SD	300.9	SD	1.133
95% DL/2 (t) UCL	248	95% H-Stat (DL/2) UCL	258.7
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	4.491
		SD in Log Scale	1.112
		Mean in Original Scale	173.6
		SD in Original Scale	301.4
		95% t UCL	246.6
		95% Percentile Bootstrap UCL	253.9
		95% BCA Bootstrap UCL	289.9
		95% H-UCL	246.9

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.94	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	224.1		
nu star	71.41		
A-D Test Statistic	1.035	**Nonparametric Statistics**	
5% A-D Critical Value	0.777	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.777	Mean	174.2
5% K-S Critical Value	0.147	SD	298.2
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	43.67
		95% KM (t) UCL	247.5
Assuming Gamma Distribution		95% KM (z) UCL	246

Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	247.3
Minimum	0.000001	95% KM (bootstrap t) UCL	358.2
Maximum	1920	95% KM (BCA) UCL	259.1
Mean	168.3	95% KM (Percentile Bootstrap) UCL	251.4
Median	88.88	95% KM (Chebyshev) UCL	364.5
SD	304.2	97.5% KM (Chebyshev) UCL	446.9
k star	0.226	99% KM (Chebyshev) UCL	608.7
Theta star	745.5		
Nu star	21.67	**Potential UCLs to Use**	
AppChi2	12.09	95% KM (Chebyshev) UCL	364.5
95% Gamma Approximate UCL	301.6		
95% Adjusted Gamma UCL	307.2		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

BENZENE

General Statistics

Number of Valid Data	116	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	114
		Percent Non-Detects	98.28%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.49	Minimum Detected	-0.713
Maximum Detected	0.73	Maximum Detected	-0.315
Mean of Detected	0.61	Mean of Detected	-0.514
SD of Detected	0.17	SD of Detected	0.282
Minimum Non-Detect	0.19	Minimum Non-Detect	-1.661
Maximum Non-Detect	3.25	Maximum Non-Detect	1.179

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	116
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	0
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	100.00%

Warning: Data set has only 2 Distinct Detected Values.
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level	
Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	0.16
SD	0.201
95% DL/2 (t) UCL	0.191
Maximum Likelihood Estimate(MLE) Method	N/A
MLE method failed to converge properly	

Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A
Data not Lognormal at 5% Significance Level	
Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	-2.046
SD	0.477
95% H-Stat (DL/2) UCL	0.157
Log ROS Method	
Mean in Log Scale	N/A
SD in Log Scale	N/A
Mean in Original Scale	N/A
SD in Original Scale	N/A
95% t UCL	N/A
95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A
95% H-UCL	N/A

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	N/A
5% A-D Critical Value	N/A
K-S Test Statistic	N/A
5% K-S Critical Value	N/A
Data not Gamma Distributed at 5% Significance Level	
Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	N/A
Maximum	N/A
Mean	N/A
Median	N/A
SD	N/A
k star	N/A
Theta star	N/A
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL	N/A
95% Adjusted Gamma UCL	N/A

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only
Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	0.492
SD	0.0226
SE of Mean	0.00302
95% KM (t) UCL	0.497
95% KM (z) UCL	0.497
95% KM (jackknife) UCL	0.647
95% KM (bootstrap t) UCL	0.492
95% KM (BCA) UCL	0.73
95% KM (Percentile Bootstrap) UCL	0.73
95% KM (Chebyshev) UCL	0.505
97.5% KM (Chebyshev) UCL	0.511
99% KM (Chebyshev) UCL	0.522
Potential UCLs to Use	
95% KM (t) UCL	0.497
95% KM (% Bootstrap) UCL	0.73

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

BROMODICHLOROMETHANE

General Statistics

Number of Valid Data	116	Number of Detected Data	1
Number of Distinct Detected Data	1	Number of Non-Detect Data	115
		Percent Non-Detects	99.14%

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable BROMODICHLOROMETHANE was not processed!

CADMIUM

General Statistics

Number of Valid Data	48	Number of Detected Data	7
Number of Distinct Detected Data	5	Number of Non-Detect Data	41
		Percent Non-Detects	85.42%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.5	Minimum Detected	-0.693
Maximum Detected	22.3	Maximum Detected	3.105
Mean of Detected	3.9	Mean of Detected	0.199
SD of Detected	8.123	SD of Detected	1.357
Minimum Non-Detect	0.28	Minimum Non-Detect	-1.273
Maximum Non-Detect	1.3	Maximum Non-Detect	0.262

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	46
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	95.83%

Warning: There are only 7 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.494	Shapiro Wilk Test Statistic	0.721
5% Shapiro Wilk Critical Value	0.803	5% Shapiro Wilk Critical Value	0.803
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.953	Mean	-0.806
SD	3.16	SD	0.881
95% DL/2 (t) UCL	1.719	95% H-Stat (DL/2) UCL	0.875
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.875
		SD in Log Scale	2.098
		Mean in Original Scale	0.673

SD in Original Scale	3.208
95% t UCL	1.45
95% Percentile Bootstrap UCL	1.586
95% BCA Bootstrap UCL	2.129
95% H-UCL	1.598

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.404
Theta Star	9.658
nu star	5.653
A-D Test Statistic	1.34
5% A-D Critical Value	0.749
K-S Test Statistic	0.749
5% K-S Critical Value	0.327

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	22.3
Mean	0.753
Median	0.000001
SD	3.309
k star	0.0879
Theta star	8.564
Nu star	8.436
AppChi2	2.99
95% Gamma Approximate UCL	2.123
95% Adjusted Gamma UCL	2.197

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	1.017
SD	3.111
SE of Mean	0.486
95% KM (t) UCL	1.831
95% KM (z) UCL	1.815
95% KM (jackknife) UCL	1.779
95% KM (bootstrap t) UCL	9.869
95% KM (BCA) UCL	2.009
95% KM (Percentile Bootstrap) UCL	1.926
95% KM (Chebyshev) UCL	3.133
97.5% KM (Chebyshev) UCL	4.049
99% KM (Chebyshev) UCL	5.848

Potential UCLs to Use

95% KM (BCA) UCL	2.009

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

CHLOROFORM

General Statistics

Number of Valid Data	116	Number of Detected Data	28
Number of Distinct Detected Data	26	Number of Non-Detect Data	88
		Percent Non-Detects	75.86%

Raw Statistics

Minimum Detected	0.2
Maximum Detected	7.4
Mean of Detected	1.795
SD of Detected	1.901
Minimum Non-Detect	0.16
Maximum Non-Detect	2.3

Log-transformed Statistics

Minimum Detected	-1.609
Maximum Detected	2.001
Mean of Detected	0.0761
SD of Detected	1.032
Minimum Non-Detect	-1.833
Maximum Non-Detect	0.833

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	108
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	8
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	93.10%

UCL Statistics

Normal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.783
5% Shapiro Wilk Critical Value	0.924

Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	0.538
SD	1.173
95% DL/2 (t) UCL	0.719
Maximum Likelihood Estimate(MLE) Method	N/A

MLE yields a negative mean

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.95
5% Shapiro Wilk Critical Value	0.924

Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	-1.632
SD	1.164
95% H-Stat (DL/2) UCL	0.498
Log ROS Method	
Mean in Log Scale	-2.647
SD in Log Scale	1.997
Mean in Original Scale	0.478
SD in Original Scale	1.187
95% t UCL	0.66
95% Percentile Bootstrap UCL	0.665
95% BCA Bootstrap UCL	0.714
95% H-UCL	0.966

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	1.024
Theta Star	1.753
nu star	57.34
A-D Test Statistic	0.856
5% A-D Critical Value	0.771
K-S Test Statistic	0.771
5% K-S Critical Value	0.17

Data follow Appr. Gamma Distribution at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	7.4
Mean	0.433
Median	0.000001
SD	1.201
k star	0.0895
Theta star	4.842
Nu star	20.76
AppChi2	11.41
95% Gamma Approximate UCL	0.788
95% Adjusted Gamma UCL	0.794

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data Follow Appr. Gamma Distribution at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.588
SD	1.143
SE of Mean	0.108
95% KM (t) UCL	0.767
95% KM (z) UCL	0.766
95% KM (jackknife) UCL	0.735
95% KM (bootstrap t) UCL	0.808
95% KM (BCA) UCL	0.872
95% KM (Percentile Bootstrap) UCL	0.812
95% KM (Chebyshev) UCL	1.059
97.5% KM (Chebyshev) UCL	1.263
99% KM (Chebyshev) UCL	1.664

Potential UCLs to Use

95% KM (t) UCL	0.767

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

CIS-1,2-DICHLOROETHENE

General Statistics

Number of Valid Data	84	Number of Detected Data	51
Number of Distinct Detected Data	47	Number of Non-Detect Data	33
		Percent Non-Detects	39.29%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.31	Minimum Detected	-1.171
Maximum Detected	261	Maximum Detected	5.565
Mean of Detected	30.75	Mean of Detected	2.159
SD of Detected	60.01	SD of Detected	1.687
Minimum Non-Detect	0.19	Minimum Non-Detect	-1.661
Maximum Non-Detect	0.25	Maximum Non-Detect	-1.386

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	33
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	51
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	39.29%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.322	Lilliefors Test Statistic	0.08
5% Lilliefors Critical Value	0.124	5% Lilliefors Critical Value	0.124
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	18.71	Mean	0.438
SD	48.95	SD	2.52
95% DL/2 (t) UCL	27.6	95% H-Stat (DL/2) UCL	113.6
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	0.545
		SD in Log Scale	2.517
		Mean in Original Scale	18.76
		SD in Original Scale	48.93
		95% t UCL	27.64
		95% Percentile Bootstrap UCL	28.09
		95% BCA Bootstrap UCL	30.92
		95% H-UCL	125.1

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.485	**Data appear Lognormal at 5% Significance Level**	
Theta Star	63.43		
nu star	49.44		
A-D Test Statistic	1.629	**Nonparametric Statistics**	
5% A-D Critical Value	0.814	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.814	Mean	18.79
5% K-S Critical Value	0.131	SD	48.63
Data not Gamma Distributed at 5% Significance Level		SE of Mean	5.359
		95% KM (t) UCL	27.7
Assuming Gamma Distribution		95% KM (z) UCL	27.6

Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	27.67
Minimum	0.000001	95% KM (bootstrap t) UCL	31.98
Maximum	261	95% KM (BCA) UCL	28.43
Mean	18.67	95% KM (Percentile Bootstrap) UCL	28.04
Median	1.75	95% KM (Chebyshev) UCL	42.15
SD	48.97	97.5% KM (Chebyshev) UCL	52.26
k star	0.117	99% KM (Chebyshev) UCL	72.11
Theta star	159.1		
Nu star	19.71	**Potential UCLs to Use**	
AppChi2	10.64	97.5% KM (Chebyshev) UCL	52.26
95% Gamma Approximate UCL	34.59		
95% Adjusted Gamma UCL	34.97		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

COBALT

General Statistics

Number of Valid Data	48	Number of Detected Data	21
Number of Distinct Detected Data	16	Number of Non-Detect Data	27
		Percent Non-Detects	56.25%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.6	Minimum Detected	-0.511
Maximum Detected	17.7	Maximum Detected	2.874
Mean of Detected	2.771	Mean of Detected	0.618
SD of Detected	3.651	SD of Detected	0.826
Minimum Non-Detect	0.51	Minimum Non-Detect	-0.673
Maximum Non-Detect	87.9	Maximum Non-Detect	4.476

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	48
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	0
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.531	Shapiro Wilk Test Statistic	0.941
5% Shapiro Wilk Critical Value	0.908	5% Shapiro Wilk Critical Value	0.908
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2.595	Mean	0.229
SD	6.617	SD	0.914
95% DL/2 (t) UCL	4.198	95% H-Stat (DL/2) UCL	2.576
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	0.0181
		SD in Log Scale	0.899
		Mean in Original Scale	1.644
		SD in Original Scale	2.606

95% t UCL	2.275
95% Percentile Bootstrap UCL	2.323
95% BCA Bootstrap UCL	2.747
95% H-UCL	2.044

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	1.223
Theta Star	2.266
nu star	51.37
A-D Test Statistic	0.89
5% A-D Critical Value	0.761
K-S Test Statistic	0.761
5% K-S Critical Value	0.193

Data follow Appr. Gamma Distribution at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	17.7
Mean	1.654
Median	1.096
SD	2.69
k star	0.191
Theta star	8.659
Nu star	18.34
AppChi2	9.634
95% Gamma Approximate UCL	3.148
95% Adjusted Gamma UCL	3.213

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data Follow Appr. Gamma Distribution at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	1.718
SD	2.577
SE of Mean	0.389
95% KM (t) UCL	2.371
95% KM (z) UCL	2.358
95% KM (jackknife) UCL	2.363
95% KM (bootstrap t) UCL	3.167
95% KM (BCA) UCL	2.436
95% KM (Percentile Bootstrap) UCL	2.428
95% KM (Chebyshev) UCL	3.414
97.5% KM (Chebyshev) UCL	4.149
99% KM (Chebyshev) UCL	5.591

Potential UCLs to Use

95% KM (t) UCL	2.371

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

COPPER

General Statistics

Number of Valid Data	48	Number of Detected Data	13
Number of Distinct Detected Data	12	Number of Non-Detect Data	35
		Percent Non-Detects	72.92%

Raw Statistics

Minimum Detected	1.5
Maximum Detected	504
Mean of Detected	57.12
SD of Detected	137.1
Minimum Non-Detect	1.1
Maximum Non-Detect	5.9

Log-transformed Statistics

Minimum Detected	0.405
Maximum Detected	6.223
Mean of Detected	2.316
SD of Detected	1.86
Minimum Non-Detect	0.0953
Maximum Non-Detect	1.775

Note: Data have multiple DLs - Use of KM Method is recommended	
For all methods (except KM, DL/2, and ROS Methods),	
Observations < Largest ND are treated as NDs	
Number treated as Non-Detect	42
Number treated as Detected	6
Single DL Non-Detect Percentage	87.50%

UCL Statistics

Normal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.457
5% Shapiro Wilk Critical Value	0.866
Data not Normal at 5% Significance Level	
Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	16.39
SD	73.66
95% DL/2 (t) UCL	34.23
Maximum Likelihood Estimate(MLE) Method	N/A
MLE yields a negative mean	

Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.888
5% Shapiro Wilk Critical Value	0.866
Data appear Lognormal at 5% Significance Level	
Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	0.766
SD	1.365
95% H-Stat (DL/2) UCL	9.449
Log ROS Method	
Mean in Log Scale	-0.492
SD in Log Scale	2.441
Mean in Original Scale	15.97
SD in Original Scale	73.75
95% t UCL	33.83
95% Percentile Bootstrap UCL	36.56
95% BCA Bootstrap UCL	50.52
95% H-UCL	54.23

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	0.346
Theta Star	165.1
nu star	8.998
A-D Test Statistic	1.107
5% A-D Critical Value	0.813
K-S Test Statistic	0.813
5% K-S Critical Value	0.254
Data follow Appr. Gamma Distribution at 5% Significance Level	
Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	504
Mean	16.38
Median	0.000001
SD	73.82
k star	0.0823
Theta star	199
Nu star	7.904
AppChi2	2.68
95% Gamma Approximate UCL	48.33
95% Adjusted Gamma UCL	50.08

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only	
Data Follow Appr. Gamma Distribution at 5% Significance Level	
Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	16.65
SD	72.83
SE of Mean	10.94
95% KM (t) UCL	35.01
95% KM (z) UCL	34.65
95% KM (jackknife) UCL	34.39
95% KM (bootstrap t) UCL	132.5
95% KM (BCA) UCL	38.36
95% KM (Percentile Bootstrap) UCL	36.88
95% KM (Chebyshev) UCL	64.35
97.5% KM (Chebyshev) UCL	84.98
99% KM (Chebyshev) UCL	125.5
Potential UCLs to Use	
95% KM (t) UCL	35.01

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

ETHYLBENZENE

General Statistics

Number of Valid Data	116	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	114
		Percent Non-Detects	98.28%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.44	Minimum Detected	-0.821
Maximum Detected	2.15	Maximum Detected	0.765
Mean of Detected	1.295	Mean of Detected	-0.0278
SD of Detected	1.209	SD of Detected	1.122
Minimum Non-Detect	0.203	Minimum Non-Detect	-1.593
Maximum Non-Detect	3.3	Maximum Non-Detect	1.194

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	116
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: Data set has only 2 Distinct Detected Values.
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.182	Mean	-1.969
SD	0.275	SD	0.51
95% DL/2 (t) UCL	0.225	95% H-Stat (DL/2) UCL	0.174
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% t UCL	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
		95% H-UCL	N/A

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.455
5% K-S Critical Value	N/A	SD	0.159
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0211
		95% KM (t) UCL	0.49
Assuming Gamma Distribution		95% KM (z) UCL	0.49
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.561
Minimum	N/A	95% KM (bootstrap t) UCL	N/A
Maximum	N/A	95% KM (BCA) UCL	N/A
Mean	N/A	95% KM (Percentile Bootstrap) UCL	N/A
Median	N/A	95% KM (Chebyshev) UCL	0.547
SD	N/A	97.5% KM (Chebyshev) UCL	0.587
k star	N/A	99% KM (Chebyshev) UCL	0.665
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (BCA) UCL	N/A
95% Gamma Approximate UCL	N/A		
95% Adjusted Gamma UCL	N/A		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

HEPTACHLOR

General Statistics

Number of Valid Data	48	Number of Detected Data	1
Number of Distinct Detected Data	1	Number of Non-Detect Data	47
		Percent Non-Detects	97.92%

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable HEPTACHLOR was not processed!

IRON

General Statistics

Number of Valid Data	21	Number of Detected Data	20
Number of Distinct Detected Data	20	Number of Non-Detect Data	1
		Percent Non-Detects	4.76%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	46.95	Minimum Detected	3.849
Maximum Detected	33300	Maximum Detected	10.41
Mean of Detected	3279	Mean of Detected	6.172
SD of Detected	8515	SD of Detected	1.797

Minimum Non-Detect	25	Minimum Non-Detect	3.219
Maximum Non-Detect	25	Maximum Non-Detect	3.219

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.421	Shapiro Wilk Test Statistic	0.896
5% Shapiro Wilk Critical Value	0.905	5% Shapiro Wilk Critical Value	0.905
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3123	Mean	5.998
SD	8329	SD	1.923
95% DL/2 (t) UCL	6258	95% H-Stat (DL/2) UCL	14369
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	2850	Mean in Log Scale	5.967
SD	8383	SD in Log Scale	1.988
95% MLE (t) UCL	6005	Mean in Original Scale	3123
95% MLE (Tiku) UCL	5689	SD in Original Scale	8330
		95% t UCL	6258
		95% Percentile Bootstrap UCL	6422
		95% BCA Bootstrap UCL	7810
		95% H UCL	17555

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.331	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	9919		
nu star	13.22		
A-D Test Statistic	2.346	**Nonparametric Statistics**	
5% A-D Critical Value	0.834	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.834	Mean	3125
5% K-S Critical Value	0.209	SD	8128
Data not Gamma Distributed at 5% Significance Level		SE of Mean	1820
		95% KM (t) UCL	6264
Assuming Gamma Distribution		95% KM (z) UCL	6118
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	6259
Minimum	0.000001	95% KM (bootstrap t) UCL	32472
Maximum	33300	95% KM (BCA) UCL	6352
Mean	3123	95% KM (Percentile Bootstrap) UCL	6324
Median	516	95% KM (Chebyshev) UCL	11057
SD	8330	97.5% KM (Chebyshev) UCL	14489
k star	0.247	99% KM (Chebyshev) UCL	21231
Theta star	12642		
Nu star	10.37	**Potential UCLs to Use**	
AppChi2	4.177	99% KM (Chebyshev) UCL	21231
95% Gamma Approximate UCL	7756		
95% Adjusted Gamma UCL	8352		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

MANGANESE

General Statistics

Number of Valid Observations	22	Number of Distinct Observations	22

Raw Statistics		**Log-transformed Statistics**	
Minimum	19.2	Minimum of Log Data	2.955
Maximum	2825	Maximum of Log Data	7.946
Mean	674.6	Mean of log Data	5.655
Median	228	SD of log Data	1.457
SD	836		
Std. Error of Mean	178.2		
Coefficient of Variation	1.239		
Skewness	1.45		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.765	Shapiro Wilk Test Statistic	0.965
Shapiro Wilk Critical Value	0.911	Shapiro Wilk Critical Value	0.911
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	981.3	95% H-UCL	2337
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1990
95% Adjusted-CLT UCL (Chen-1995)	1027	97.5% Chebyshev (MVUE) UCL	2524
95% Modified-t UCL (Johnson-1978)	990.5	99% Chebyshev (MVUE) UCL	3573

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.637	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	1058		
MLE of Mean	674.6		
MLE of Standard Deviation	844.9		
nu star	28.05		
Approximate Chi Square Value (.05)	16.96	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0386	95% CLT UCL	967.7
Adjusted Chi Square Value	16.32	95% Jackknife UCL	981.3
		95% Standard Bootstrap UCL	967.3
Anderson-Darling Test Statistic	0.547	95% Bootstrap-t UCL	1079
Anderson-Darling 5% Critical Value	0.787	95% Hall's Bootstrap UCL	990.5
Kolmogorov-Smirnov Test Statistic	0.181	95% Percentile Bootstrap UCL	978.1
Kolmogorov-Smirnov 5% Critical Value	0.193	95% BCA Bootstrap UCL	1018
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1451
		97.5% Chebyshev(Mean, Sd) UCL	1788
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	2448
95% Approximate Gamma UCL	1115		
95% Adjusted Gamma UCL	1159		

Potential UCL to Use	
Use 95% Approximate Gamma UCL	1115

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

MERCURY

General Statistics

Number of Valid Data	48	Number of Detected Data	18
Number of Distinct Detected Data	16	Number of Non-Detect Data	30
		Percent Non-Detects	62.50%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.051	Minimum Detected	-2.976
Maximum Detected	3.7	Maximum Detected	1.308
Mean of Detected	0.574	Mean of Detected	-1.343
SD of Detected	0.934	SD of Detected	1.17
Minimum Non-Detect	0.037	Minimum Non-Detect	-3.297
Maximum Non-Detect	0.17	Maximum Non-Detect	-1.772

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	39
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	9
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	81.25%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.585	Shapiro Wilk Test Statistic	0.911
5% Shapiro Wilk Critical Value	0.897	5% Shapiro Wilk Critical Value	0.897
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.246	Mean	-2.476
SD	0.618	SD	1.225
95% DL/2 (t) UCL	0.396	95% H-Stat (DL/2) UCL	0.283
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-3.3
		SD in Log Scale	1.866
		Mean in Original Scale	0.227
		SD in Original Scale	0.624
		95% t UCL	0.378
		95% Percentile Bootstrap UCL	0.393
		95% BCA Bootstrap UCL	0.453
		95% H-UCL	0.533

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.67	**Data appear Lognormal at 5% Significance Level**	
Theta Star	0.857		
nu star	24.11		
A-D Test Statistic	1.503	**Nonparametric Statistics**	
5% A-D Critical Value	0.778	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.778	Mean	0.25
5% K-S Critical Value	0.211	SD	0.61
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0906
		95% KM (t) UCL	0.402
Assuming Gamma Distribution		95% KM (z) UCL	0.399

Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.389
Minimum	0.000001	95% KM (bootstrap t) UCL	0.625
Maximum	3.7	95% KM (BCA) UCL	0.449
Mean	0.215	95% KM (Percentile Bootstrap) UCL	0.418
Median	0.000001	95% KM (Chebyshev) UCL	0.645
SD	0.628	97.5% KM (Chebyshev) UCL	0.816
k star	0.113	99% KM (Chebyshev) UCL	1.152
Theta star	1.899		
Nu star	10.88	**Potential UCLs to Use**	
AppChi2	4.497	95% KM (BCA) UCL	0.449
95% Gamma Approximate UCL	0.52		
95% Adjusted Gamma UCL	0.536		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

METHYLENE CHLORIDE

General Statistics

Number of Valid Data	116	Number of Detected Data	1
Number of Distinct Detected Data	1	Number of Non-Detect Data	115
		Percent Non-Detects	99.14%

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable METHYLENE CHLORIDE was not processed!

NAPHTHALENE

General Statistics

Number of Valid Data	48	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	45
		Percent Non-Detects	93.75%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.796	Minimum Detected	-0.228
Maximum Detected	1.51	Maximum Detected	0.412
Mean of Detected	1.064	Mean of Detected	0.0206
SD of Detected	0.389	SD of Detected	0.343
Minimum Non-Detect	0.014	Minimum Non-Detect	-4.269
Maximum Non-Detect	0.034	Maximum Non-Detect	-3.381

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	45
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	3
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	93.75%

Warning: There are only 3 Distinct Detected Values in this data set
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.

However, results obtained using 4 to 9 distinct values may not be reliable.

It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.842
5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level	
Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	0.077
SD	0.27
95% DL/2 (t) UCL	0.142
Maximum Likelihood Estimate(MLE) Method	N/A
MLE yields a negative mean	

Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.87
5% Shapiro Wilk Critical Value	0.767
Data appear Lognormal at 5% Significance Level	
Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	-4.244
SD	1.152
95% H-Stat (DL/2) UCL	0.0424
Log ROS Method	
Mean in Log Scale	-2.586
SD in Log Scale	1.254
Mean in Original Scale	0.165
SD in Original Scale	0.269
95% t UCL	0.23
95% Percentile Bootstrap UCL	0.234
95% BCA Bootstrap UCL	0.254
95% H-UCL	0.267

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	N/A
5% A-D Critical Value	N/A
K-S Test Statistic	N/A
5% K-S Critical Value	N/A
Data not Gamma Distributed at 5% Significance Level	
Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	N/A
Maximum	N/A
Mean	N/A
Median	N/A
SD	N/A
k star	N/A
Theta star	N/A
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL	N/A
95% Adjusted Gamma UCL	N/A

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only	
Data appear Normal at 5% Significance Level	
Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	0.813
SD	0.102
SE of Mean	0.0181
95% KM (t) UCL	0.843
95% KM (z) UCL	0.843
95% KM (jackknife) UCL	0.872
95% KM (bootstrap t) UCL	0.895
95% KM (BCA) UCL	1.51
95% KM (Percentile Bootstrap) UCL	1.51
95% KM (Chebyshev) UCL	0.892
97.5% KM (Chebyshev) UCL	0.926
99% KM (Chebyshev) UCL	0.993
Potential UCLs to Use	
95% KM (t) UCL	0.843
95% KM (Percentile Bootstrap) UCL	1.51

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

NICKEL

General Statistics

Number of Valid Data	48	Number of Detected Data	18
Number of Distinct Detected Data	16	Number of Non-Detect Data	30
		Percent Non-Detects	62.50%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.8	Minimum Detected	-0.223
Maximum Detected	94	Maximum Detected	4.543
Mean of Detected	15.04	Mean of Detected	1.71
SD of Detected	23.62	SD of Detected	1.454
Minimum Non-Detect	1.2	Minimum Non-Detect	0.182
Maximum Non-Detect	11.8	Maximum Non-Detect	2.468

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	42
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	6
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	87.50%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.65	Shapiro Wilk Test Statistic	0.916
5% Shapiro Wilk Critical Value	0.897	5% Shapiro Wilk Critical Value	0.897
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	6.702	Mean	0.921
SD	15.65	SD	1.115
95% DL/2 (t) UCL	10.49	95% H-Stat (DL/2) UCL	6.979
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	0.668
		SD in Log Scale	1.427
		Mean in Original Scale	6.622
		SD in Original Scale	15.7
		95% t UCL	10.42
		95% Percentile Bootstrap UCL	10.73
		95% BCA Bootstrap UCL	12.31
		95% H-UCL	9.739

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.55	**Data appear Lognormal at 5% Significance Level**	
Theta Star	27.35		
nu star	19.79		
A-D Test Statistic	0.999	**Nonparametric Statistics**	
5% A-D Critical Value	0.79	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.79	Mean	6.477

5% K-S Critical Value	0.213	SD	15.55
Data not Gamma Distributed at 5% Significance Level		SE of Mean	2.311
		95% KM (t) UCL	10.36
Assuming Gamma Distribution		95% KM (z) UCL	10.28
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	10.23
Minimum	0.000001	95% KM (bootstrap t) UCL	14.43
Maximum	94	95% KM (BCA) UCL	10.93
Mean	7.117	95% KM (Percentile Bootstrap) UCL	10.55
Median	1.475	95% KM (Chebyshev) UCL	16.55
SD	15.9	97.5% KM (Chebyshev) UCL	20.91
k star	0.121	99% KM (Chebyshev) UCL	29.48
Theta star	59.06		
Nu star	11.57	**Potential UCLs to Use**	
AppChi2	4.945	95% KM (BCA) UCL	10.93
95% Gamma Approximate UCL	16.65		
95% Adjusted Gamma UCL	17.12		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

TETRACHLOROETHENE

General Statistics

Number of Valid Data	116	Number of Detected Data	34
Number of Distinct Detected Data	31	Number of Non-Detect Data	82
		Percent Non-Detects	70.69%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.31	Minimum Detected	-1.171
Maximum Detected	33.3	Maximum Detected	3.506
Mean of Detected	6.49	Mean of Detected	1.151
SD of Detected	8.131	SD of Detected	1.272
Minimum Non-Detect	0.27	Minimum Non-Detect	-1.309
Maximum Non-Detect	0.29	Maximum Non-Detect	-1.238

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	82
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	34
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	70.69%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.729	Shapiro Wilk Test Statistic	0.962
5% Shapiro Wilk Critical Value	0.933	5% Shapiro Wilk Critical Value	0.933
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2.002	Mean	-1.047
SD	5.234	SD	1.576
95% DL/2 (t) UCL	2.808	95% H-Stat (DL/2) UCL	1.841
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	

MLE yields a negative mean	
Mean in Log Scale	-1.833
SD in Log Scale	2.466
Mean in Original Scale	1.986
SD in Original Scale	5.241
95% t UCL	2.793
95% Percentile Bootstrap UCL	2.816
95% BCA Bootstrap UCL	3.014
95% H-UCL	8.239

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	0.769
Theta Star	8.438
nu star	52.3
A-D Test Statistic	0.754
5% A-D Critical Value	0.784
K-S Test Statistic	0.784
5% K-S Critical Value	0.156

Data follow Appr. Gamma Distribution at 5% Significance Level

Data Distribution Test with Detected Values Only

Data Follow Appr. Gamma Distribution at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	33.3
Mean	1.902
Median	0.000001
SD	5.27
k star	0.0861
Theta star	22.08
Nu star	19.98
AppChi2	10.84
95% Gamma Approximate UCL	3.507
95% Adjusted Gamma UCL	3.535

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	2.121
SD	5.169
SE of Mean	0.487
95% KM (t) UCL	2.929
95% KM (z) UCL	2.923
95% KM (jackknife) UCL	2.884
95% KM (bootstrap t) UCL	3.234
95% KM (BCA) UCL	3.112
95% KM (Percentile Bootstrap) UCL	3.007
95% KM (Chebyshev) UCL	4.245
97.5% KM (Chebyshev) UCL	5.164
99% KM (Chebyshev) UCL	6.968

Potential UCLs to Use

95% KM (t) UCL	2.929

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

TRANS-1,2-DICHLOROETHENE

General Statistics

Number of Valid Data	116	Number of Detected Data	40
Number of Distinct Detected Data	37	Number of Non-Detect Data	76
		Percent Non-Detects	65.52%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.295	Minimum Detected	-1.221
Maximum Detected	35.4	Maximum Detected	3.567
Mean of Detected	5.139	Mean of Detected	0.626
SD of Detected	8.937	SD of Detected	1.327
Minimum Non-Detect	0.16	Minimum Non-Detect	-1.833
Maximum Non-Detect	0.387	Maximum Non-Detect	-0.95

Note: Data have multiple DLs - Use of KM Method is recommended
For all methods (except KM, DL/2, and ROS Methods),
Observations < Largest ND are treated as NDs

Number treated as Non-Detect	79
Number treated as Detected	37
Single DL Non-Detect Percentage	68.10%

UCL Statistics

Normal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.572
5% Shapiro Wilk Critical Value	0.94

Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	1.852
SD	5.729
95% DL/2 (t) UCL	2.734
Maximum Likelihood Estimate(MLE) Method	N/A

MLE yields a negative mean

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.899
5% Shapiro Wilk Critical Value	0.94

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	-1.19
SD	1.554
95% H-Stat (DL/2) UCL	1.526
Log ROS Method	
Mean in Log Scale	-2.102
SD in Log Scale	2.454
Mean in Original Scale	1.815
SD in Original Scale	5.74
95% t UCL	2.699
95% Percentile Bootstrap UCL	2.764
95% BCA Bootstrap UCL	3.04
95% H-UCL	6.072

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.581
Theta Star	8.848
nu star	46.46
A-D Test Statistic	3.214
5% A-D Critical Value	0.803
K-S Test Statistic	0.803
5% K-S Critical Value	0.146

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	35.4
Mean	1.772
Median	0.000001
SD	5.753
k star	0.0912
Theta star	19.43
Nu star	21.16
AppChi2	11.71
95% Gamma Approximate UCL	3.202
95% Adjusted Gamma UCL	3.226

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	1.965
SD	5.67
SE of Mean	0.533
95% KM (t) UCL	2.849
95% KM (z) UCL	2.842
95% KM (jackknife) UCL	2.81
95% KM (bootstrap t) UCL	3.347
95% KM (BCA) UCL	2.972
95% KM (Percentile Bootstrap) UCL	2.884
95% KM (Chebyshev) UCL	4.289
97.5% KM (Chebyshev) UCL	5.295
99% KM (Chebyshev) UCL	7.27

Potential UCLs to Use

95% KM (BCA) UCL	2.972

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

TRICHLOROETHENE

General Statistics

Number of Valid Data	116	Number of Detected Data	75
Number of Distinct Detected Data	71	Number of Non-Detect Data	41
		Percent Non-Detects	35.34%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.25	Minimum Detected	-1.386
Maximum Detected	3700	Maximum Detected	8.216
Mean of Detected	189.3	Mean of Detected	3.226
SD of Detected	603	SD of Detected	2.148
Minimum Non-Detect	0.18	Minimum Non-Detect	-1.715
Maximum Non-Detect	0.28	Maximum Non-Detect	-1.273

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	42
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	74
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	36.21%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.396	Lilliefors Test Statistic	0.0946
5% Lilliefors Critical Value	0.102	5% Lilliefors Critical Value	0.102
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	122.5	Mean	1.327
SD	492.2	SD	3.103
95% DL/2 (t) UCL	198.2	95% H-Stat (DL/2) UCL	1841
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	1.472
		SD in Log Scale	3.031
		Mean in Original Scale	122.5
		SD in Original Scale	492.1
		95% t UCL	198.3
		95% Percentile Bootstrap UCL	204.2
		95% BCA Bootstrap UCL	242
		95% H-UCL	1610

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.331	**Data appear Lognormal at 5% Significance Level**	
Theta Star	572		
nu star	49.65		
A-D Test Statistic	3.404	**Nonparametric Statistics**	
5% A-D Critical Value	0.857	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.857	Mean	122.5
5% K-S Critical Value	0.111	SD	490

Data not Gamma Distributed at 5% Significance Level		SE of Mean	45.8
		95% KM (t) UCL	198.5
Assuming Gamma Distribution		95% KM (z) UCL	197.8
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	198.1
Minimum	0.000001	95% KM (bootstrap t) UCL	340.5
Maximum	3700	95% KM (BCA) UCL	206.8
Mean	122.4	95% KM (Percentile Bootstrap) UCL	204.5
Median	5.225	95% KM (Chebyshev) UCL	322.2
SD	492.2	97.5% KM (Chebyshev) UCL	408.5
k star	0.109	99% KM (Chebyshev) UCL	578.2
Theta star	1123		
Nu star	25.29	**Potential UCLs to Use**	
AppChi2	14.83	97.5% KM (Chebyshev) UCL	408.5
95% Gamma Approximate UCL	208.7		
95% Adjusted Gamma UCL	210.1		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

VANADIUM

General Statistics

Number of Valid Data	48	Number of Detected Data	22
Number of Distinct Detected Data	20	Number of Non-Detect Data	26
		Percent Non-Detects	54.17%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.7	Minimum Detected	-0.357
Maximum Detected	1200	Maximum Detected	7.09
Mean of Detected	62.55	Mean of Detected	1.431
SD of Detected	254.9	SD of Detected	1.689
Minimum Non-Detect	0.9	Minimum Non-Detect	-0.105
Maximum Non-Detect	9.7	Maximum Non-Detect	2.272

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	43
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	5
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	89.58%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.255	Shapiro Wilk Test Statistic	0.784
5% Shapiro Wilk Critical Value	0.911	5% Shapiro Wilk Critical Value	0.911
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	29.25	Mean	0.638
SD	173.1	SD	1.377
95% DL/2 (t) UCL	71.18	95% H-Stat (DL/2) UCL	8.526
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	0.279

SD in Log Scale	1.708
Mean in Original Scale	29.05
SD in Original Scale	173.2
95% t UCL	70.99
95% Percentile Bootstrap UCL	78.45
95% BCA Bootstrap UCL	127.1
95% H-UCL	12.63

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.256
Theta Star	244.7
nu star	11.24
A-D Test Statistic	4.613
5% A-D Critical Value	0.865
K-S Test Statistic	0.865
5% K-S Critical Value	0.203

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	1200
Mean	28.67
Median	0.000001
SD	173.2
k star	0.0905
Theta star	316.8
Nu star	8.688
AppChi2	3.14
95% Gamma Approximate UCL	79.33
95% Adjusted Gamma UCL	82.02

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	29.23
SD	171.3
SE of Mean	25.31
95% KM (t) UCL	71.7
95% KM (z) UCL	70.87
95% KM (jackknife) UCL	71.17
95% KM (bootstrap t) UCL	1733
95% KM (BCA) UCL	79.43
95% KM (Percentile Bootstrap) UCL	78.67
95% KM (Chebyshev) UCL	139.6
97.5% KM (Chebyshev) UCL	187.3
99% KM (Chebyshev) UCL	281.1

Potential UCLs to Use

95% KM (Chebyshev) UCL	139.6

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

VINYL CHLORIDE

General Statistics

Number of Valid Data	116	Number of Detected Data	14
Number of Distinct Detected Data	13	Number of Non-Detect Data	102
		Percent Non-Detects	87.93%

Raw Statistics

Minimum Detected	0.45
Maximum Detected	25.6
Mean of Detected	6.407
SD of Detected	7.923
Minimum Non-Detect	0.21
Maximum Non-Detect	4.4

Log-transformed Statistics

Minimum Detected	-0.799
Maximum Detected	3.243
Mean of Detected	1.049
SD of Detected	1.383
Minimum Non-Detect	-1.561
Maximum Non-Detect	1.482

Note: Data have multiple DLs - Use of KM Method is recommended

Number treated as Non-Detect 111

For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	5
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	95.69%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.769	Shapiro Wilk Test Statistic	0.916
5% Shapiro Wilk Critical Value	0.874	5% Shapiro Wilk Critical Value	0.874
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.92	Mean	-1.641
SD	3.364	SD	1.193
95% DL/2 (t) UCL	1.438	95% H-Stat (DL/2) UCL	0.516
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-4.671
		SD in Log Scale	3.202
		Mean in Original Scale	0.803
		SD in Original Scale	3.384
		95% t UCL	1.324
		95% Percentile Bootstrap UCL	1.349
		95% BCA Bootstrap UCL	1.561
		95% H-UCL	6.79

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.63	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	10.16		
nu star	17.65		
A-D Test Statistic	0.652	**Nonparametric Statistics**	
5% A-D Critical Value	0.771	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.771	Mean	1.17
5% K-S Critical Value	0.238	SD	3.287
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.317
		95% KM (t) UCL	1.695
Assuming Gamma Distribution		95% KM (z) UCL	1.691
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.598
Minimum	0.000001	95% KM (bootstrap t) UCL	2.032
Maximum	25.6	95% KM (BCA) UCL	2.049
Mean	0.773	95% KM (Percentile Bootstrap) UCL	1.805
Median	0.000001	95% KM (Chebyshev) UCL	2.55
SD	3.39	97.5% KM (Chebyshev) UCL	3.148
k star	0.0757	99% KM (Chebyshev) UCL	4.321
Theta star	10.22		
Nu star	17.55	**Potential UCLs to Use**	
AppChi2	9.069	95% KM (t) UCL	1.695
95% Gamma Approximate UCL	1.497		
95% Adjusted Gamma UCL	1.509		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	Sheet3.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	10000

ANTIMONY

General Statistics

Number of Valid Data	48	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	46
		Percent Non-Detects	95.83%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	1.8	Minimum Detected	0.588
Maximum Detected	6.1	Maximum Detected	1.808
Mean of Detected	3.95	Mean of Detected	1.198
SD of Detected	3.041	SD of Detected	0.863
Minimum Non-Detect	1.8	Minimum Non-Detect	0.588
Maximum Non-Detect	5.7	Maximum Non-Detect	1.74

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	47
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	1
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	97.92%

Warning: Data set has only 2 Distinct Detected Values.
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2.251	Mean	0.715
SD	0.92	SD	0.475
95% DL/2 (t) UCL	2.474	95% H-Stat (DL/2) UCL	2.605

Maximum Likelihood Estimate(MLE) Method	N/A
MLE method failed to converge properly	

Log ROS Method	
Mean in Log Scale	N/A
SD in Log Scale	N/A
Mean in Original Scale	N/A
SD in Original Scale	N/A
95% t UCL	N/A
95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A
95% H-UCL	N/A

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	N/A
5% A-D Critical Value	N/A
K-S Test Statistic	N/A
5% K-S Critical Value	N/A

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	N/A
Maximum	N/A
Mean	N/A
Median	N/A
SD	N/A
k star	N/A
Theta star	N/A
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL	N/A
95% Adjusted Gamma UCL	N/A

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	1.89
SD	0.614
SE of Mean	0.125
95% KM (t) UCL	2.1
95% KM (z) UCL	2.096
95% KM (jackknife) UCL	4.688
95% KM (bootstrap t) UCL	1.89
95% KM (BCA) UCL	6.1
95% KM (Percentile Bootstrap) UCL	6.1
95% KM (Chebyshev) UCL	2.436
97.5% KM (Chebyshev) UCL	2.672
99% KM (Chebyshev) UCL	3.137

Potential UCLs to Use

95% KM (t) UCL	2.1
95% KM (% Bootstrap) UCL	6.1

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

ARSENIC

General Statistics

Number of Valid Data	48	Number of Detected Data	11
Number of Distinct Detected Data	10	Number of Non-Detect Data	37
		Percent Non-Detects	77.08%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	1.7	Minimum Detected	0.531
Maximum Detected	30.8	Maximum Detected	3.428
Mean of Detected	8.6	Mean of Detected	1.782
SD of Detected	8.42	SD of Detected	0.909
Minimum Non-Detect	1.7	Minimum Non-Detect	0.531
Maximum Non-Detect	6	Maximum Non-Detect	1.792

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	42
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	6
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	87.50%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.758	Shapiro Wilk Test Statistic	0.934
5% Shapiro Wilk Critical Value	0.85	5% Shapiro Wilk Critical Value	0.85
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3.557	Mean	0.89
SD	4.825	SD	0.771
95% DL/2 (t) UCL	4.725	95% H-Stat (DL/2) UCL	4.155
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.284
		SD in Log Scale	1.557
		Mean in Original Scale	2.502
		SD in Original Scale	5.173
		95% t UCL	3.755
		95% Percentile Bootstrap UCL	3.822
		95% BCA Bootstrap UCL	4.384
		95% H-UCL	5

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.15	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	7.476		
nu star	25.31		
A-D Test Statistic	0.405	**Nonparametric Statistics**	
5% A-D Critical Value	0.742	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.742	Mean	3.342
5% K-S Critical Value	0.26	SD	4.812
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.732
		95% KM (t) UCL	4.569
Assuming Gamma Distribution		95% KM (z) UCL	4.545

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	30.8
Mean	2.149
Median	0.000001
SD	5.319
k star	0.0912
Theta star	23.57
Nu star	8.752
AppChi2	3.178
95% Gamma Approximate UCL	5.918
95% Adjusted Gamma UCL	6.118

95% KM (jackknife) UCL	4.47
95% KM (bootstrap t) UCL	5.794
95% KM (BCA) UCL	6.444
95% KM (Percentile Bootstrap) UCL	5.624
95% KM (Chebyshev) UCL	6.53
97.5% KM (Chebyshev) UCL	7.91
99% KM (Chebyshev) UCL	10.62
Potential UCLs to Use	
95% KM (t) UCL	4.569

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

BARIUM

General Statistics

Number of Valid Data	48	Number of Detected Data	38
Number of Distinct Detected Data	37	Number of Non-Detect Data	10
		Percent Non-Detects	20.83%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	8.9	Minimum Detected	2.186
Maximum Detected	1140	Maximum Detected	7.039
Mean of Detected	166.5	Mean of Detected	4.678
SD of Detected	192.5	SD of Detected	0.986
Minimum Non-Detect	15.3	Minimum Non-Detect	2.728
Maximum Non-Detect	192	Maximum Non-Detect	5.257

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	36
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	12
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	75.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.64	Shapiro Wilk Test Statistic	0.977
5% Shapiro Wilk Critical Value	0.938	5% Shapiro Wilk Critical Value	0.938
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	140.1	Mean	4.421
SD	179	SD	1.06
95% DL/2 (t) UCL	183.4	95% H-Stat (DL/2) UCL	211.6
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	4.417
		SD in Log Scale	1.03
		Mean in Original Scale	138.8
		SD in Original Scale	179.4
		95% t UCL	182.2
		95% Percentile Bootstrap UCL	185.4
		95% BCA Bootstrap UCL	203.1
		95% H-UCL	201

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.2	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	138.8		
nu star	91.17		
A-D Test Statistic	0.413	**Nonparametric Statistics**	
5% A-D Critical Value	0.771	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.771	Mean	139.1
5% K-S Critical Value	0.147	SD	177.8
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	26.06
		95% KM (t) UCL	182.8
Assuming Gamma Distribution		95% KM (z) UCL	182

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	1140
Mean	135.3
Median	85.45
SD	181.9
k star	0.239
Theta star	565
Nu star	22.99
AppChi2	13.08
95% Gamma Approximate UCL	237.8
95% Adjusted Gamma UCL	242.1

95% KM (jackknife) UCL	182.7
95% KM (bootstrap t) UCL	215.1
95% KM (BCA) UCL	187.9
95% KM (Percentile Bootstrap) UCL	185.7
95% KM (Chebyshev) UCL	252.7
97.5% KM (Chebyshev) UCL	301.9
99% KM (Chebyshev) UCL	398.4
Potential UCLs to Use	
95% KM (BCA) UCL	187.9

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

COBALT

General Statistics

Number of Valid Data	48	Number of Detected Data	16
Number of Distinct Detected Data	14	Number of Non-Detect Data	32
		Percent Non-Detects	66.67%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.9	Minimum Detected	-0.105
Maximum Detected	3.7	Maximum Detected	1.308
Mean of Detected	2.006	Mean of Detected	0.602
SD of Detected	0.888	SD of Detected	0.452
Minimum Non-Detect	0.51	Minimum Non-Detect	-0.673
Maximum Non-Detect	3.55	Maximum Non-Detect	1.267

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	46
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	95.83%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.921	Shapiro Wilk Test Statistic	0.95
5% Shapiro Wilk Critical Value	0.887	5% Shapiro Wilk Critical Value	0.887
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.171	Mean	-0.0703
SD	0.825	SD	0.702
95% DL/2 (t) UCL	1.37	95% H-Stat (DL/2) UCL	1.469
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.0568
		SD in Log Scale	0.649
		Mean in Original Scale	1.167
		SD in Original Scale	0.827
		95% t UCL	1.368
		95% Percentile Bootstrap UCL	1.371
		95% BCA Bootstrap UCL	1.39
		95% H-UCL	1.409

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	4.515	**Data appear Normal at 5% Significance Level**	
Theta Star	0.444		
nu star	144.5		
A-D Test Statistic	0.291	**Nonparametric Statistics**	
5% A-D Critical Value	0.741	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.741	Mean	1.332
5% K-S Critical Value	0.216	SD	0.71
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.112
		95% KM (t) UCL	1.519
Assuming Gamma Distribution		95% KM (z) UCL	1.516

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	3.7
Mean	0.87
Median	0.265
SD	1.064
k star	0.135
Theta star	6.448
Nu star	12.96
AppChi2	5.865
95% Gamma Approximate UCL	1.923
95% Adjusted Gamma UCL	1.973

95% KM (jackknife) UCL	1.495
95% KM (bootstrap t) UCL	1.537
95% KM (BCA) UCL	1.617
95% KM (Percentile Bootstrap) UCL	1.562
95% KM (Chebyshev) UCL	1.819
97.5% KM (Chebyshev) UCL	2.029
99% KM (Chebyshev) UCL	2.443
Potential UCLs to Use	
95% KM (t) UCL	1.519
95% KM (Percentile Bootstrap) UCL	1.562

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

IRON

General Statistics

Number of Valid Data	14	Number of Detected Data	8
Number of Distinct Detected Data	8	Number of Non-Detect Data	6
		Percent Non-Detects	42.86%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	14.8	Minimum Detected	2.695
Maximum Detected	21300	Maximum Detected	9.966
Mean of Detected	2689	Mean of Detected	4.07
SD of Detected	7520	SD of Detected	2.444
Minimum Non-Detect	7.4	Minimum Non-Detect	2.001
Maximum Non-Detect	7.4	Maximum Non-Detect	2.001

Warning: There are only 8 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.421	Shapiro Wilk Test Statistic	0.607
5% Shapiro Wilk Critical Value	0.818	5% Shapiro Wilk Critical Value	0.818
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1538	Mean	2.886
SD	5688	SD	2.286
95% DL/2 (t) UCL	4230	95% H-Stat (DL/2) UCL	6850
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	1.61
		SD in Log Scale	3.609
		Mean in Original Scale	1537
		SD in Original Scale	5688
		95% t UCL	4229
		95% Percentile Bootstrap UCL	4576
		95% BCA Bootstrap UCL	6100
		95% H-UCL	10405734

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.204	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	13170		
nu star	3.266		
A-D Test Statistic	2.049	**Nonparametric Statistics**	
5% A-D Critical Value	0.838	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.838	Mean	1543

5% K-S Critical Value	0.324

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	21300
Mean	1536
Median	15.8
SD	5688
k star	0.108
Theta star	14244
Nu star	3.02
AppChi2	0.378
95% Gamma Approximate UCL	12262
95% Adjusted Gamma UCL	16336

Note: DL/2 is not a recommended method.

SD	5480
SE of Mean	1566
95% KM (t) UCL	4315
95% KM (z) UCL	4118
95% KM (jackknife) UCL	4233
95% KM (bootstrap t) UCL	1119891
95% KM (BCA) UCL	4583
95% KM (Percentile Bootstrap) UCL	4581
95% KM (Chebyshev) UCL	8367
97.5% KM (Chebyshev) UCL	11320
99% KM (Chebyshev) UCL	17121

Potential UCLs to Use

99% KM (Chebyshev) UCL	17121

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

MANGANESE

General Statistics

Number of Valid Observations 14

Number of Distinct Observations 14

Raw Statistics

Minimum	52
Maximum	2715
Mean	726.7
Median	585.5
SD	772.9
Std. Error of Mean	206.6
Coefficient of Variation	1.064
Skewness	1.677

Log-transformed Statistics

Minimum of Log Data	3.951
Maximum of Log Data	7.907
Mean of log Data	6.022
SD of log Data	1.197

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.804
Shapiro Wilk Critical Value	0.874

Data not Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.965
Shapiro Wilk Critical Value	0.874

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	1093

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	1165
95% Modified-t UCL (Johnson-1978)	1108

Assuming Lognormal Distribution

95% H-UCL	2388
95% Chebyshev (MVUE) UCL	1986
97.5% Chebyshev (MVUE) UCL	2508
99% Chebyshev (MVUE) UCL	3532

Gamma Distribution Test

k star (bias corrected)	0.847
Theta Star	857.9
MLE of Mean	726.7
MLE of Standard Deviation	789.6
nu star	23.72
Approximate Chi Square Value (.05)	13.64
Adjusted Level of Significance	0.0312
Adjusted Chi Square Value	12.63
Anderson-Darling Test Statistic	0.228
Anderson-Darling 5% Critical Value	0.76
Kolmogorov-Smirnov Test Statistic	0.123
Kolmogorov-Smirnov 5% Critical Value	0.235

Data appear Gamma Distributed at 5% Significance Level

Data Distribution

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	1264
95% Adjusted Gamma UCL	1365

Nonparametric Statistics

95% CLT UCL	1067
95% Jackknife UCL	1093
95% Standard Bootstrap UCL	1056
95% Bootstrap-t UCL	1369
95% Hall's Bootstrap UCL	2694
95% Percentile Bootstrap UCL	1076
95% BCA Bootstrap UCL	1148
95% Chebyshev(Mean, Sd) UCL	1627
97.5% Chebyshev(Mean, Sd) UCL	2017
99% Chebyshev(Mean, Sd) UCL	2782

Potential UCL to Use

Use 95% Approximate Gamma UCL 1264

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

MERCURY

General Statistics

Number of Valid Data	48	Number of Detected Data	11
Number of Distinct Detected Data	11	Number of Non-Detect Data	37
		Percent Non-Detects	77.08%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.042	Minimum Detected	-3.17
Maximum Detected	0.38	Maximum Detected	-0.968
Mean of Detected	0.114	Mean of Detected	-2.36
SD of Detected	0.0933	SD of Detected	0.588
Minimum Non-Detect	0.037	Minimum Non-Detect	-3.297
Maximum Non-Detect	0.15	Maximum Non-Detect	-1.897

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	47
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	97.92%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.655	Shapiro Wilk Test Statistic	0.914
5% Shapiro Wilk Critical Value	0.85	5% Shapiro Wilk Critical Value	0.85
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0622	Mean	-3.034
SD	0.0564	SD	0.708
95% DL/2 (t) UCL	0.0759	95% H-Stat (DL/2) UCL	0.0763
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-3.387
		SD in Log Scale	0.846
		Mean in Original Scale	0.05
		SD in Original Scale	0.0596
		95% t UCL	0.0644
		95% Percentile Bootstrap UCL	0.0655
		95% BCA Bootstrap UCL	0.0711
		95% H-UCL	0.0633

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	2.09	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	0.0546		
nu star	45.98		
A-D Test Statistic	0.706	**Nonparametric Statistics**	
5% A-D Critical Value	0.735	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.735	Mean	0.0641
5% K-S Critical Value	0.257	SD	0.0535
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.00864
		95% KM (t) UCL	0.0786
Assuming Gamma Distribution		95% KM (z) UCL	0.0783

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	0.38
Mean	0.0362
Median	0.000001
SD	0.0695
k star	0.125
Theta star	0.289
Nu star	12.01
AppChi2	5.232
95% Gamma Approximate UCL	0.083
95% Adjusted Gamma UCL	0.0853

95% KM (jackknife) UCL	0.0761
95% KM (bootstrap t) UCL	0.0866
95% KM (BCA) UCL	0.0971
95% KM (Percentile Bootstrap) UCL	0.0888
95% KM (Chebyshev) UCL	0.102
97.5% KM (Chebyshev) UCL	0.118
99% KM (Chebyshev) UCL	0.15
Potential UCLs to Use	
95% KM (t) UCL	0.0786

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	Sheet2.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	10000

1,1,2-TRICHLOROETHANE

General Statistics

Number of Valid Data	8	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	4
		Percent Non-Detects	50.00%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	1.3	Minimum Detected	0.262
Maximum Detected	25.55	Maximum Detected	3.241
Mean of Detected	9.1	Mean of Detected	1.518
SD of Detected	11.38	SD of Detected	1.4
Minimum Non-Detect	0.17	Minimum Non-Detect	-1.772
Maximum Non-Detect	0.33	Maximum Non-Detect	-1.109

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	4
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	50.00%

Warning: There are only 4 Distinct Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.808	Shapiro Wilk Test Statistic	0.907
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	4.613	Mean	-0.308
SD	8.86	SD	2.171
95% DL/2 (t) UCL	10.55	95% H-Stat (DL/2) UCL	1769
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.693
		SD in Log Scale	2.612
		Mean in Original Scale	4.587
		SD in Original Scale	8.874
		95% t UCL	10.53
		95% Percentile Bootstrap UCL	9.985
		95% BCA Bootstrap UCL	13
		95% H-UCL	36299

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only
k star (bias corrected)	0.38	**Data appear Normal at 5% Significance Level**
Theta Star	23.96	
nu star	3.038	

A-D Test Statistic	0.372
5% A-D Critical Value	0.669
K-S Test Statistic	0.669
5% K-S Critical Value	0.404

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data

Minimum	0.000001
Maximum	25.55
Mean	4.55
Median	0.65
SD	8.896
k star	0.149
Theta star	30.51
Nu star	2.386
AppChi2	0.216
95% Gamma Approximate UCL	50.15
95% Adjusted Gamma UCL	N/A

Note: DL/2 is not a recommended method.

Nonparametric Statistics

Kaplan-Meier (KM) Method

Mean	5.2
SD	7.985
SE of Mean	3.26
95% KM (t) UCL	11.38
95% KM (z) UCL	10.56
95% KM (jackknife) UCL	10.81
95% KM (bootstrap t) UCL	16.78
95% KM (BCA) UCL	14.52
95% KM (Percentile Bootstrap) UCL	12.31
95% KM (Chebyshev) UCL	19.41
97.5% KM (Chebyshev) UCL	25.56
99% KM (Chebyshev) UCL	37.63

Potential UCLs to Use

95% KM (t) UCL	11.38
95% KM (Percentile Bootstrap) UCL	12.31

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

CIS-1,2-DICHLOROETHENE

General Statistics

Number of Valid Data	8	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	4
		Percent Non-Detects	50.00%

Raw Statistics

Minimum Detected	44.07
Maximum Detected	261
Mean of Detected	105.2
SD of Detected	104.1
Minimum Non-Detect	0.19
Maximum Non-Detect	0.25

Log-transformed Statistics

Minimum Detected	3.786
Maximum Detected	5.565
Mean of Detected	4.366
SD of Detected	0.809
Minimum Non-Detect	-1.661
Maximum Non-Detect	-1.386

Note: Data have multiple DLs - Use of KM Method is recommended	
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Non-Detect 4
Observations < Largest ND are treated as NDs	Number treated as Detected 4
	Single DL Non-Detect Percentage 50.00%

Warning: There are only 4 Distinct Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.687
5% Shapiro Wilk Critical Value	0.748

Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method

Mean	52.65

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.768
5% Shapiro Wilk Critical Value	0.748

Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method

Mean	1.075

SD	88.3
95% DL/2 (t) UCL	111.8
Maximum Likelihood Estimate(MLE) Method	N/A
MLE yields a negative mean	

SD	3.56
95% H-Stat (DL/2) UCL	2.712E+09
Log ROS Method	
Mean in Log Scale	3.185
SD in Log Scale	1.411
Mean in Original Scale	56.68
SD in Original Scale	85.67
95% t UCL	114.1
95% Percentile Bootstrap UCL	113.1
95% BCA Bootstrap UCL	139.4
95% H-UCL	718.2

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.636
Theta Star	165.4
nu star	5.088
A-D Test Statistic	0.725
5% A-D Critical Value	0.661
K-S Test Statistic	0.661
5% K-S Critical Value	0.398
Data not Gamma Distributed at 5% Significance Level	

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	261
Mean	52.6
Median	22.03
SD	88.34
k star	0.142
Theta star	369.9
Nu star	2.275
AppChi2	0.195
95% Gamma Approximate UCL	614.7
95% Adjusted Gamma UCL	N/A

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Lognormal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	74.63
SD	70.68
SE of Mean	28.86
95% KM (t) UCL	129.3
95% KM (z) UCL	122.1
95% KM (jackknife) UCL	122.2
95% KM (bootstrap t) UCL	501.8
95% KM (BCA) UCL	158.9
95% KM (Percentile Bootstrap) UCL	133.4
95% KM (Chebyshev) UCL	200.4
97.5% KM (Chebyshev) UCL	254.8
99% KM (Chebyshev) UCL	361.7

Potential UCLs to Use

95% KM (t) UCL	129.3
95% KM (% Bootstrap) UCL	133.4

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

TETRACHLOROETHENE

General Statistics

Number of Valid Data	8
Number of Distinct Detected Data	4

Number of Detected Data	4
Number of Non-Detect Data	4
Percent Non-Detects	50.00%

Raw Statistics

Minimum Detected	6
Maximum Detected	33.3
Mean of Detected	22.13
SD of Detected	11.51
Minimum Non-Detect	0.285
Maximum Non-Detect	0.29

Log-transformed Statistics

Minimum Detected	1.792
Maximum Detected	3.506
Mean of Detected	2.926
SD of Detected	0.769
Minimum Non-Detect	-1.255
Maximum Non-Detect	-1.238

Note: Data have multiple DLs - Use of KM Method is recommended	
For all methods (except KM, DL/2, and ROS Methods),	
Number treated as Non-Detect	4
Number treated as Detected	4

Observations < Largest ND are treated as NDs | Single DL Non-Detect Percentage 50.00%

Warning: There are only 4 Distinct Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.894
5% Shapiro Wilk Critical Value	0.748

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	11.13
SD	13.96
95% DL/2 (t) UCL	20.48
Maximum Likelihood Estimate(MLE) Method	
Mean	2.394
SD	23.02
95% MLE (t) UCL	17.82
95% MLE (Tiku) UCL	21.36

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.937
Theta Star	23.62
nu star	7.493
A-D Test Statistic	0.559
5% A-D Critical Value	0.659
K-S Test Statistic	0.659
5% K-S Critical Value	0.397

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	33.3
Mean	11.06
Median	3
SD	14.02
k star	0.148
Theta star	74.87
Nu star	2.364
AppChi2	0.212
95% Gamma Approximate UCL	123.4
95% Adjusted Gamma UCL	N/A

Note: DL/2 is not a recommended method.

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.786
5% Shapiro Wilk Critical Value	0.748

Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	0.493
SD	2.649
95% H-Stat (DL/2) UCL	163207
Log ROS Method	
Mean in Log Scale	1.908
SD in Log Scale	1.233
Mean in Original Scale	12.37
SD in Original Scale	12.88
95% t UCL	21
95% Percentile Bootstrap UCL	19.74
95% BCA Bootstrap UCL	20.58
95% H UCL	94.13

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	14.06
SD	10.71
SE of Mean	4.372
95% KM (t) UCL	22.34
95% KM (z) UCL	21.25
95% KM (jackknife) UCL	25.79
95% KM (bootstrap t) UCL	18.75
95% KM (BCA) UCL	28.02
95% KM (Percentile Bootstrap) UCL	27.71
95% KM (Chebyshev) UCL	33.12
97.5% KM (Chebyshev) UCL	41.36
99% KM (Chebyshev) UCL	57.56

Potential UCLs to Use

95% KM (t) UCL	22.34
95% KM (Percentile Bootstrap) UCL	27.71

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

TRICHLOROETHENE

General Statistics

Number of Valid Data	8	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	3
		Percent Non-Detects	37.50%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.62	Minimum Detected	-0.478
Maximum Detected	3700	Maximum Detected	8.216
Mean of Detected	1130	Mean of Detected	5.324
SD of Detected	1506	SD of Detected	3.386
Minimum Non-Detect	0.18	Minimum Non-Detect	-1.715
Maximum Non-Detect	0.22	Maximum Non-Detect	-1.514

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	3
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	5
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	37.50%

Warning: There are only 5 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.787	Shapiro Wilk Test Statistic	0.808
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	706.3	Mean	2.475
SD	1280	SD	4.693
95% DL/2 (t) UCL	1564	95% H-Stat (DL/2) UCL	3.952E+16
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	233.7	Mean in Log Scale	2.331
SD	1682	SD in Log Scale	4.91
95% MLE (t) UCL	1360	Mean in Original Scale	706.3
95% MLE (Tiku) UCL	1474	SD in Original Scale	1280
		95% t UCL	1564
		95% Percentile Bootstrap UCL	1478
		95% BCA Bootstrap UCL	1850
		95% H UCL	9.952E+17

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.288	**Data appear Normal at 5% Significance Level**	
Theta Star	3918		
nu star	2.884		
A-D Test Statistic	0.326	**Nonparametric Statistics**	
5% A-D Critical Value	0.727	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.727	Mean	706.5
5% K-S Critical Value	0.376	SD	1197
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	473.3
		95% KM (t) UCL	1603
Assuming Gamma Distribution		95% KM (z) UCL	1485

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	3700
Mean	706.3
Median	172.1
SD	1280
k star	0.144
Theta star	4908
Nu star	2.302
AppChi2	0.2
95% Gamma Approximate UCL	8138
95% Adjusted Gamma UCL	13285

95% KM (jackknife) UCL	1520
95% KM (bootstrap t) UCL	4440
95% KM (BCA) UCL	1729
95% KM (Percentile Bootstrap) UCL	1602
95% KM (Chebyshev) UCL	2770
97.5% KM (Chebyshev) UCL	3662
99% KM (Chebyshev) UCL	5416
Potential UCLs to Use	
95% KM (t) UCL	1603
95% KM (Percentile Bootstrap) UCL	1602

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

VINYL CHLORIDE

General Statistics

Number of Valid Data	8	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	5
		Percent Non-Detects	62.50%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.45	Minimum Detected	0.896
Maximum Detected	7	Maximum Detected	1.946
Mean of Detected	4.1	Mean of Detected	1.296
SD of Detected	2.519	SD of Detected	0.568
Minimum Non-Detect	0.21	Minimum Non-Detect	-1.561
Maximum Non-Detect	1.537	Maximum Non-Detect	0.43

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	5
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	3
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	62.50%

Warning: There are only 3 Distinct Detected Values in this data set
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.815	Shapiro Wilk Test Statistic	0.855
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.687	Mean	-0.668
SD	2.42	SD	1.785
95% DL/2 (t) UCL	3.308	95% H-Stat (DL/2) UCL	105
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.342	Mean in Log Scale	-0.016

SD	3.723
95% MLE (t) UCL	2.836
95% MLE (Tiku) UCL	4.021

SD in Log Scale	1.176
Mean in Original Scale	1.839
SD in Original Scale	2.311
95% t UCL	3.387
95% Percentile Bootstrap UCL	3.197
95% BCA Bootstrap UCL	3.737
95% H UCL	11.01

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	N/A
5% A-D Critical Value	N/A
K-S Test Statistic	N/A
5% K-S Critical Value	N/A

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	N/A
Maximum	N/A
Mean	N/A
Median	N/A
SD	N/A
k star	N/A
Theta star	N/A
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL	N/A
95% Adjusted Gamma UCL	N/A

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	3.069
SD	1.492
SE of Mean	0.646
95% KM (t) UCL	4.292
95% KM (z) UCL	4.131
95% KM (jackknife) UCL	4.053
95% KM (bootstrap t) UCL	9.871
95% KM (BCA) UCL	7
95% KM (Percentile Bootstrap) UCL	7
95% KM (Chebyshev) UCL	5.884
97.5% KM (Chebyshev) UCL	7.102
99% KM (Chebyshev) UCL	9.495

Potential UCLs to Use

95% KM (t) UCL	4.292
95% KM (Percentile Bootstrap) UCL	7

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.